AN ALIGNMENT CHART FOR ATMOSPHERIC TRANSMISSION OF SOLAR RADIATION

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Kimball [1], in 1930, using Fowle's radiation data, gave a graph containing a series of curves of precipitable water vapor, w, in the total atmospheric column as a function of air mass, m, and of percentage transmission, t, of solar radiation by a dust-free atmosphere, a graph which is still in use. Absorption by both water vapor and dry air, as well as molecular scattering, are considered in the data on which Kimball's work is based. Although it suffices for one, or several transmission determinations, his graph is not convenient for making a large number of them quickly. As an alternative, figure 1 was developed when it became necessary to make a large number, several thousand, of transmission determinations in a short time, and it proved to be very efficient. Its use is illustrated by the thin straight line connecting the three scales; for unit air mass and 5 cm. of water vapor, the transmission is 68 percent. Kimball's graph (curves 9 to 15 of his fig. 1) was converted to a form suitable for transforming to an alignment chart by graphically altering the horizontal coordinate in such a way as to make the water vapor curves straight lines. For this reason there will be slight differences between his graph and figure 1, but these will never amount to more than one percent of the transmission values.

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REFERENCE

1. H. H. Kimball, "Measurements of Solar Radiation Intensity and Determinations of its Depletion by the Atmosphere," *Monthly Weather Review*, vol. 58, No. 2, February 1930, pp. 43–52.

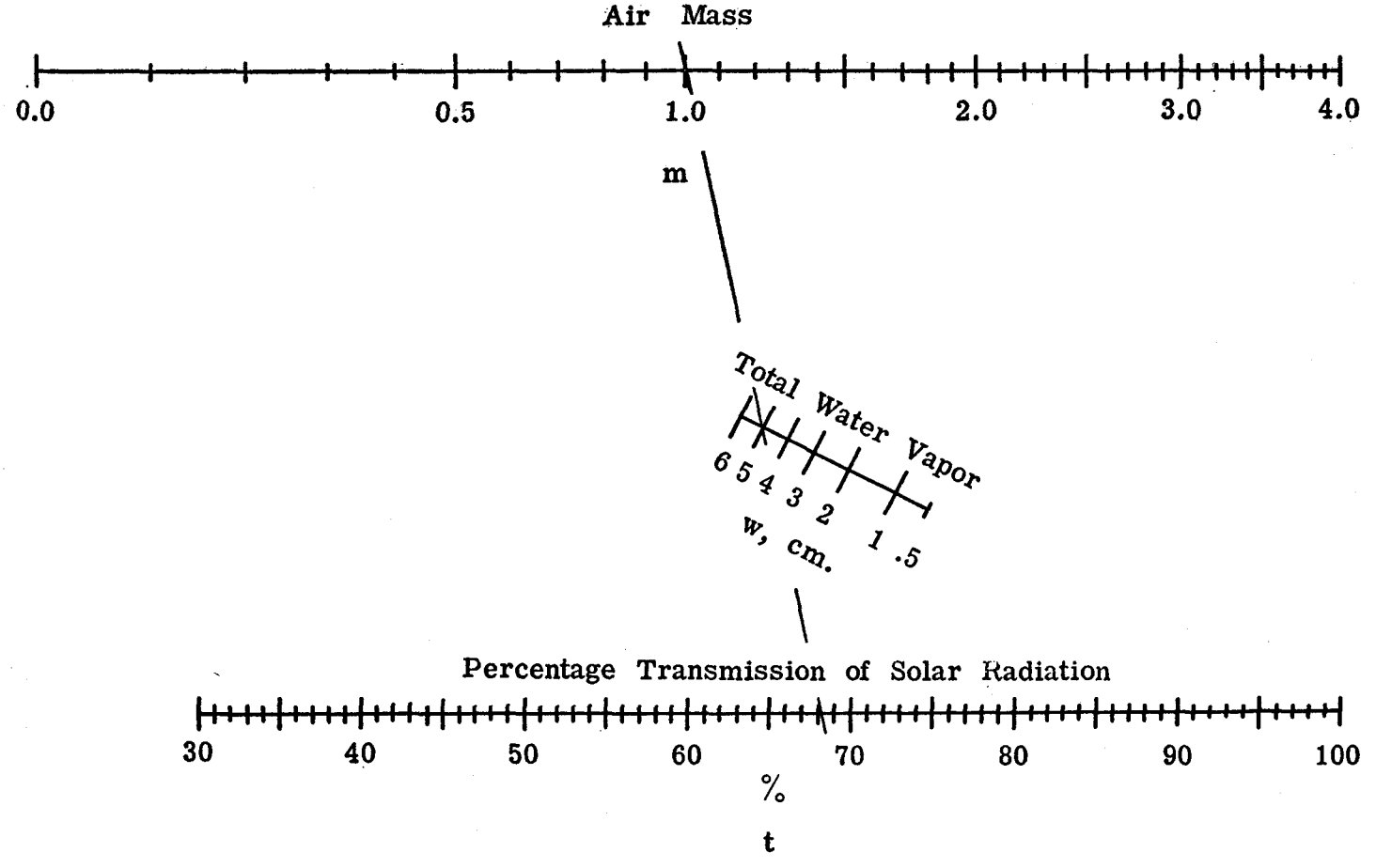

FIGURE 1.—Nomogram for atmospheric transmission of solar radiation by dust-free air. Based on Kimball's curves [1].